

## REMARKS

Upon entry of the present amendment, claims 1-7 and 9-21 and 24-34 are pending in the application.

Claims 1, 21 and 25 have been amended to recite at least one hydrocarbon contaminant. Support for these amendments may be found throughout the Specification and at least at [20] and [27].

Claims 5, 21 and 25 have been amended to include the limitations of canceled claims 22 and 23 and further limit the claims to allowing the catalyst nanoparticles displaced from the gas separation device to join the fluidized catalyst nanoparticles and continue reacting with the contaminated gas within the hollow interior region. Support for these amendments may be found throughout the Specification and at least at [38].

Claim 7 has been amended to correct inadvertent typographical error.

Claims 10 and 24 have been amended to recite proper dependent form.

Claims 22 and 23 have been canceled.

No claims have been added.

No new matter has been introduced by the foregoing amendments and new claim.

Reconsideration is respectfully requested in view of the foregoing amendments and/or following remarks.

### **Claim Objections**

Applicants greatly appreciate the Examiner's notice and suggestion to amend claim 10 to correct an inadvertent typographical error. As amended, claim 10 properly depends from claim 9.

**Claim Rejections under 35 U.S.C. §103.**

1. **Rejection of Claims 1-3, 9, 10 and 21 stand rejected under 35 U.S.C. § 103(a), as being unpatentable over U.S. Patent Publication No. US 2002/0006368 to Becker et al., hereafter "Becker" in view of U.S. Patent No. 6,500,969 to Zhou, hereinafter "Zhou" and U.S. Patent No. 6,782,892 to Li et al., hereafter "Li" and further evidenced by U.S. Patent No. 4,994,498 to Kinkade, hereinafter "Kinkade".**

Applicants greatly appreciate the detailed basis of the Examiner's rejection but must respectfully disagree.

In the outstanding office action, the Examiner states that Becker discloses the entry of gas into a bed of catalyst that will fluidize at least a portion of an already fluidized bed, but acknowledges that Becker fails to teach a plurality of catalysts as being nanoparticles as required by Applicants' independent claims 1 and 21. (Office Action of 12/20/07, pages 3 and 4.) Zhou and Li, and further evidenced by Kinkade, are used to remedy the deficiencies in Becker. In particular, the Examiner states that the combination of Becker and Zhou, i.e., 'modified Becker' "...teaches nanosized oxidation catalyst in the range of 15 to 100 nm (see Zhou, claim 15), but is silent on particle size in the range of 15-25 nm." (Office Action of 12/20/07, page 4.) Li is relied upon to remedy this deficiency, further in view of Kinkade.

In particular, the Examiner states that particle size of a catalyst in a fluidized bed is a variable that is routinely varied to achieve desired performance (see Kinkade, col. 7 lines 51-59) and capable of optimization by routine experimentation. The size of the particle would have been considered to be a result effective variable. As such particle size of the catalyst particles is not considered to confer patentability to the claim. (Office Action of 12/20/07, page 5.)

Applicants respectfully disagree and submit that the invention of amended independent claims 1 and 21 cannot be rendered prima facie obvious by either the combination of Becker, Zhou, and Li or Becker, Zhou, Li and Kinkade. The

PTO has failed to view the references in their entirety and as a result the Examiner fails to recognize that the references cannot be combined.

The prior art is good for everything it teaches, not just the invention it describes or claims. See *EWP Corp. v. Reliance Universal, Inc.*, 755 F.2d at 907 ("A reference must be considered for everything it teaches by way of technology and is not limited to the particular invention it is describing and attempting to protect. On the issue of obviousness, the combined teachings of the prior art as a whole must be considered."). "It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." *In re Wesslau*, 353 F.2d 238, 241 (C.C.P.A. 1965);

In this case, the cited combination of Becker and Zhou fail to achieve Applicants' claimed invention. Indeed, Applicants' believe that the express teachings of the two claimed inventions contradict each other and cannot be combined. The Examiner relies on the combination of references Becker and Zhou to produce "modified Becker". However, by replacing Becker's oxidizing agents with Zhou's catalyst nanoparticles that only make hydrogen peroxide, "modified Becker" appears to result in an inoperative embodiment and violates the basic principle set forth in Zhou. Moreover, Li is directed to a catalyst contained in a solid cigarette filter (Li, Figure 4 and 5; col.3, lines 55-59.) not a fluidized or gaseous dispersion.

As amended, the inventions of claims 1 and 21 require a contaminated gas comprising at least one hydrocarbon contaminant. The reference to Kinkade, which the Examiner cites for catalyst particle dimension, is directed to catalyst composition for use in a reaction of carbon monoxide and hydrogen wherein the most prevalent by-product is hydrocarbon, saturated and unsaturated. (Kinkade: Abstract, col.2, lines 51-54.) One skilled in the art would

not be motivated to use the catalyst of Kinkade in a reaction to reduce or remove hydrocarbon compositions.

Accordingly, the cited combinations of references fail to disclose all of the required limitations of the amended inventions, especially with regard to the requirement that "fluidized catalyst nanoparticles react with a contaminated gas (containing at least one hydrocarbon) to produce a decontaminated gas".

The Examiner picks and chooses only that portion of each reference to support the position taken by the Examiner and not what the reference fairly suggests to one skilled in the art. Taken in their entirety, the combination of Becker, Zhou, and Li, further evidenced by Kinkade fails to teach or suggest the present invention. In determining obviousness, § 103 expressly requires considering the claimed invention "as a whole." Focusing the § 103 inquiry on a particular aspect of the invention that differs from the prior art improperly disregards the "as a whole" statutory mandate. *Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.*, 411 F.3d 1332 (Fed.Cir. 2005).

The Examiner acknowledges that Becker does not disclose catalyst nanoparticles and suggests that Becker be modified to include the nanoparticulates of Zhou to produce "modified Becker". As stated above, "modified Becker" appears to be an inoperable embodiment. Further, it is the Examiner's position that the size of the particles is a "result-effective variable" which can be optimized by experimentation and requires a showing of unexpected results.

However, case law makes clear that an evaluation of the obviousness of the invention as a whole requires looking not only to the subject matter which is literally recited in the claim in question but also to those properties of the subject matter which are inherent in the subject matter *and* are disclosed in the specification. *In re Antonie*, 559 F.2d 618, 619 (C.C.P.A. 1977). The court acknowledged that it would ordinarily consider optimization of a variable in a known process *prima facie* obvious, the court stated the exceptions to this rule

exist "in cases where the results of optimizing a variable, which was known to be result effective, were unexpectedly good. This case, in which the parameter optimized was not recognized to be a result-effective variable, is another exception." *Id.* at 620 (citations omitted).

The present invention, as a whole, is the plurality of catalyst nanoparticles having an average diameter of 15-25 nm of which at least a portion is fluidized (claim 1) and a gaseous dispersion of fluidized catalyst nanoparticles (claim 21), which reacts with a contaminated gas comprising hydrocarbon contaminant in a fluidized bed reactor to produce a decontaminated gas *and* the inherent and disclosed property of surface area relative to diameter. (Specification, paragraph [0024].) The size of the catalyst particles is part of the invention as a whole, not a result-effective variable. The determination of particle size, therefore, is not the result of optimizing a variable. As such, the plurality of catalyst nanoparticles goes to the invention as a whole. Thus, this required term is not a result-effective variable which requires a showing of unexpected results.

However, even if the Examiner persists in combining the references of Becker, Zkou and Li, with Kinkade, Applicants submit that Kinkade does not teach or suggest nanoparticulate catalyst and thus fails to rectify the deficiencies of the principal combination. For example, Kinkade merely discloses:

"In the case of the fluidized-bed operations, a powdered catalyst of suitable size may be appropriate. Those skilled in the art will be able to practice the invention by selecting the form and size of catalyst, based on conditions encountered in use."

(Kinkade, col.7, lines 53-55.)

Therefore, in addition to failing to teach or suggest nanoparticulate catalyst, Kinkade does not disclose or provide any guidance with a reasonable expectation of success as to which parameter, form, size and/or combinations of both size and shape would/should be considered by one skilled in the art. As such, the Examiner's reliance on Kinkade merely constitutes an improper "obvious to try" modification, and "to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior

art gave either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful." *In re O'Farrell*, 853 F.2d 894 (Fed. Cir. 1988).

The Examiner also fails to consider the invention as a whole when stating the position that the present claim limitation of introducing a fluidizing material such that the fluidizing material fluidizes at least a portion of the plurality of catalyst nanoparticles is disclosed in Becker, and, further, is a process limitation which does not have patentable weight. (Office Action of 12/20/07, page 3.)

As acknowledged by the Examiner, Becker does not disclose catalyst nanoparticles. Applicants agree and further believe that Becker cannot therefore disclose fluidized nanoparticles. Applicants believe that the Examiner fails to consider the references and the present invention as a whole in making the rejection, and part of evaluating the invention as a whole includes considering functional language in a claim. "It is ... entirely proper to consider the functions of an invention in seeking to determine the meaning of particular claim language." *Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1319 (Fed. Cir.), *reh'g denied* (April 11, 2005).

By failing to consider the invention as a whole, the Examiner has used improper hindsight to support the rejection. As stated in *Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.*, 411 F.3d 1332 (Fed.Cir. 2005).

The "as a whole" instruction in title 35 prevents evaluation of the invention part by part. ... Without this important requirement, an obviousness assessment might successfully break an invention into its component parts, then find a prior art reference corresponding to each component. ... This line of reasoning would import hindsight into the obviousness determination by using the invention as a roadmap to find its prior art components. Further, this improper method would discount the value of combining various existing features or principles in a new way to achieve a new result--often the essence of invention. [internal citations to *Ruiz* omitted].

*Princeton*, 411 F.3d at 1337.

The Examiner has used Applicants' Specification as a road map to pick and choose pieces of the prior art references to arrive at improper combinations of references.

The cited combination of references is improper and, even if combined, fails to teach or disclose all of the required limitations of the apparatus of claim 1 and the method of claim 21. Reconsideration and removal of the rejection of amended independent Claims 1 and 21 and dependent Claims 2-3 and 9-10 is respectfully requested.

2. **Rejection of Claims 4, 5, 22 and 23 under 35 U.S.C. § 103(a), as being unpatentable over U.S. Patent Publication No. US 2002/0006368 to Becker et al., hereafter "Becker", U.S. Patent No. 6,500,969 to Zhou, hereinafter "Zhou" and U.S. Patent No. 6,782,892 to Li et al., hereafter "Li" as applied to claims 3 and 21, and further in view of U.S. Patent No. 6,887,291 to Alford, hereinafter "Alford".**

Claims 4, 5, 22 and 23 stand rejected as obvious over the combination of Becker, Zhou and Li, and further in view of Alford.

The outstanding Office Action acknowledges that modified Becker fails to teach the claimed nanoparticle separation from effluent gas method and apparatus comprising: a second input for introducing a backpressure pulse of gaseous material into the hollow interior region through the port, or a gas permeable separation device in communication with said port and the exit of gas from the hollow interior region through the gas permeable separation device for separating catalyst nanoparticles and causing them to collect upon the gas permeable separation device and where the entrance of the back pressure pulse displaces the collected catalyst nanoparticles.

Alford is relied upon to rectify the deficiencies of Becker as modified by Zhou and Li. In particular, the office action states:

Alford also discloses a filter device for removing nanoparticles from gas streams using a gas permeable separating device (Fig. 1(2), see Abstract).

Alford teaches a second input (5) for introducing a backpressure pulse (pulse jet) of gaseous material into a hollow interior region (10) (col. 7 lines 59-67) in order to clean a filter (col. 7 lines 43-55).

Alford also teaches a gas permeable separation device (filter, 2) in communication with a hollow interior region (10) and the second input (5) and the entrance for introducing a backpressure pulse (pulse jet) into the hollow interior region (10) displacing collected catalyst nanoparticles (col. 7 lines 43-55). Alford teaches this in order to allow catalyst nanoparticles to be collected by said gas permeable separation device (filter) and to clean said gas permeable separation device of said catalyst nanoparticles (col. 7 lines 35-67).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the gas permeable separation device (in communication with the second input) and the entrance of the backpressure pulse into the hollow interior region to displace the collected nanoparticles of Alford, with the fluidized bed oxidation reactor of the modified Becker in order to allow catalyst nanoparticles to be collected by said gas permeable separation device and to clean said gas permeable separation device of said catalyst nanoparticle.

(Office Action of 12/20/07, page 8-9.)

Applicants greatly appreciate the detailed basis of the rejection but must respectfully disagree.

The forgoing remarks for Section 1 are incorporated herein by reference. Applicants believe that nothing in Alford remedies the deficiencies in Becker, Zhou and Li, as discussed above with respect to independent claims 1 and 21. Claims 22 and 23 have been canceled and the rejection thereof is rendered moot. Since claims 4 and 5 depend from independent claim 1, they necessarily incorporate all of the limitations thereof. As a result, these dependent claims are non-obvious for the reasons presented in Section 1.



Moreover, Alford teaches collection devices for the removal of carbon nanomaterials from the processing. Upon dislodging the particles, the particles fall into a receptor or collector, shaped to facilitate removal from the reactor. As amended, claims 1 recites introducing a backpressure pulse of gaseous material into the hollow region allowing the catalyst nanoparticles to join the fluidized catalyst nanoparticles and to continue reacting with the contaminated gas within the hollow interior region. To the contrary, Alford discloses removal, not recycling, of the collected particles from the reactor. Nothing in Alford teaches or suggests introducing a backpressure pulse of gaseous material into the hollow region allowing the catalyst nanoparticles to join the fluidized catalyst nanoparticles and to thus continue reacting with the contaminated gas within the hollow interior region. (Specification, [0038].)

Applicants believe that the cited combination of references is improper and, even if combined, fails to teach or disclose all of the required limitations of the apparatus of claim 1 and the method of claim 21. Reconsideration and removal of the rejection of amended independent Claims 1 and 21 and dependent Claims 4, 5, 22 and 23 is respectfully requested.

3. **Rejection of Claims 7 and 24 under 35 U.S.C. § 103(a), as being unpatentable over U.S. Patent Publication No. US 2002/0006368 to Becker et al., hereafter "Becker", U.S. Patent No. 6,500,969 to Zhou, hereafter "Zhou", U.S. Patent No. 6,782,892 to Li et al., hereafter "Li" and U.S. Patent No. 6,887,291 to Alford, hereafter "Alford" and further in view of U.S. Patent Publication No. US 2006/0078771 to Ballantine et al., hereafter "Ballantine".**

Claims 7 and 24 stand rejected as obvious over the combination of Becker, Zhou, Li and Alford and further in view of Ballantine.

The outstanding Office Action acknowledges that 'modified Becker' does not disclose a specific control strategy utilized by a control device that synchronizes the backpressure pulse valve with the first input valve. However, it is the position of the Examiner that Ballantine discloses a series of controlled valves introducing multiple fluid inlets to the same process space and teaches a

valve synchronization process of closing an inlet valve (402) connected to a vessel (412) when a second inlet valve (401) is opened in order to prevent backflow through the first process valve (paragraph 42). It is also the Examiner's position that 'modified Becker' discloses a vessel with two 'competing inlet' (process inlet and fluidizing inlet competing with backpressure pulse inlet. By the term 'competing inlet' the Examiner is referring to two independent inlet that are injecting fluid into the same space. (Office Action of 12/20/07, page 10.)

Applicants greatly appreciate the detailed basis of the rejection but respectfully disagree.

The forgoing remarks of Sections 1 and 2 are incorporated by reference herein. As such, Applicants disagree with the combination of Becker and Zhou to form 'modified Becker' for the reasons stated therein, and the combination of Becker, Zhou, Li and Alford. Ballantine does not remedy the deficiencies in Becker, Zhou, Li and Alford.

Applicants also request clarification as to the Examiner's discussion of 'competing inlets'. As restated above it is unclear if the two independent inlets are in 'competition' with each other or with the backpressure pulse inlets. Moreover, Applicants are unclear as to how 'competing inlets' applies to Ballantine.

Ballantine is directed to a fuel cell system comprising a reactant delivery system of orifices wherein one-way flow of reactant flows from a reactant gas source 130, through devices (e.g., valves) 140, 150 and 160 and tubes 170, 180, 190, 200, 210, 220, and 230. As disclosed in Ballantine:

[0011] Systems under the present invention can include various additional features as discussed herein, either alone or in combination. In some embodiments, the second conduit can further include a first check valve adapted to prevent flow from the fourth conduit to the first conduit. Similarly, the third conduit can further include a second check valve adapted to prevent flow from the fourth conduit to the first conduit.



[0012] In some embodiments, the system can further include a controller coupled to the first, second, third and fourth valves. As an example, the controller can have a first mode of operation wherein the controller opens the first and fourth valves and closes the second and third valves. In a second mode of operation, the controller closes the first and fourth valves and opens the second and third valves. The system thus reverses the direction of reactant flow through the fuel cell.

Ballantine, paragraphs 11 and 12.

As shown in Figures 1-4, the one-way reactant system may express at least two operational states (direction of flow). However, each operational state allows gas direction and entry into the fuel at only one entry point. As such, Ballantine discloses two points of entry through which reactant gas may pass into the fuel cell, however, only one is the entry point and the other the exit point, based the operational state chosen. Switching the operational state has the effect of reversing the flow. (Ballantine, Specification, paragraphs 32-35.)

Applicants request clarification of the "competing inlets", as Ballantine has one inlet depositing reactant gas per mode of operation.

In addition, the system of Ballantine discloses a valve to be opened to allow the gas to be purged through a one-way valve when the purge conduit is opened. However, Valve (405) is closed to *avoid back flow into* the fuel cell (412). (Ballantine, paragraph 42.)

In contrast, the present claims recite a backpressure pulse of gaseous material that *passes into* the hollow interior region of the reactor and allowing the plurality of catalyst nanoparticles displaced from the gas separation device to join the fluidized dispersion of catalyst nanoparticles and continue reacting with the contaminated gas within the hollow interior region. (Specification, paragraph 38.)

Applicants believe that Ballantine does nothing to remedy the deficiencies of the cited combination of references with regard to independent claims 1 and 21, from which claims 7 and 24 depend, respectively. Reconsideration and removal of the rejection of claims 7 and 24 is respectfully requested.

4. Rejection of Claim 6 under 35 U.S.C. § 103(a), as being unpatentable over U.S. Patent Publication No. US 2002/0006368 to Becker et al., hereafter "Becker", U.S. Patent No. 6,500,969 to Zhou, hereinafter "Zhou" and U.S. Patent No. 6,782,892 to Li et al., hereafter "Li" as applied to claim 1, and further in view of U.S. Patent No. 5,933,702 to Goswami, hereinafter "Goswami".

Claim 6 stands rejected as obvious over the combination of Becker, Zhou and Li as applied to claim 1, and further in view of Goswami.

The outstanding Office Action acknowledges that Becker, as modified by Zhou and Li, fails to expressly teach a humidifier in communication with the first input. Goswami is relied upon to remedy this deficiency in the combination of Becker, Zhou, and Li.

Applicants greatly appreciate the detailed basis of the rejection but must respectfully disagree.

The foregoing remarks of Section 1 are hereby incorporated by reference. As Goswami as been cited for disclosing a humidifier, nothing in Goswami remedies the deficiencies in the combination of Becker, Zhou and Li as discussed above in Section 1 with respect to independent claim 1, from which claim 6 depends. Since dependent claim 6 incorporates all of the limitations of claim 1, it likewise is nonobvious over the cited combination of references for at least the reasons stated above.

5. Rejection of Claims 11 and 12 under 35 U.S.C. § 103(a), as being unpatentable over U.S. Patent Publication No. US 2002/0006368 to Becker et al., hereafter "Becker", U.S. Patent No. 6,500,969 to Zhou, hereinafter "Zhou" and U.S. Patent No. 6,782,892 to Li et al., hereafter "Li" as applied to claim 1, and further in view of U.S. Patent Publication No. US 2002/0187082 to Wu, hereinafter "Wu".

The foregoing remarks of Section 1 are herein incorporated by reference. As Wu has merely been cited for disclosing a photocatalytic/oxidation reactor which uses photocatalysts to treat polluted air, nothing in Wu remedies the deficiencies in the combination of Becker, Zhou and Li as discussed above with respect to claim 1. As dependent claims 11 and 12 incorporate all of the

limitations of claim 1, they are likewise nonobvious over the cited combination for at least the reasons discussed above.

6. **Rejection of Claims 11 and 13 under 35 U.S.C. § 103(a), as being unpatentable over U.S. Patent Publication No. US 2002/0006368 to Becker et al., hereafter "Becker", U.S. Patent No. 6,500,969 to Zhou, hereafter "Zhou" and U.S. Patent No. 6,782,892 to Li et al., hereafter "Li" as applied to claim 1, and further in view of U.S. Patent No. 6,812,470 to Sato, hereinafter "Sato".**

The forgoing remarks of Section 1 are incorporated herein by reference. Sato has merely been cited for disclosing a photocatalytic/oxidation reactor chamber and an ultraviolet light positioned outside of the reactor. As such, nothing in Sato remedies the deficiencies in the combination of Becker, Zhou and Li as discussed in Section 1 with respect to claim 1. Since dependent claims 11 and 13 incorporate all of the limitations of claim 1, claims 11 and 13 are likewise nonobvious over the cited combination of references at least for the reasons stated above.

7. **Rejection of Claim 14 under 35 U.S.C. § 103(a), as being unpatentable over U.S. Patent Publication No. US 2002/0006368 to Becker et al., hereafter "Becker", U.S. Patent No. 6,500,969 to Zhou, hereafter "Zhou", U.S. Patent No. 6,782,892 to Li et al., hereafter "Li" and U.S. Patent Publication No. US 2002/0187082 to Wu, hereafter "Wu" as applied to claim 1, and further in view of U.S. Patent No. 5,933,702 to Goswami, hereinafter "Goswami".**

The forgoing remarks of Section 1 are incorporated herein by reference. Wu and Goswami fail to remedy the deficiencies in the combination of Becker, Zhou and Li as discussed in Section 1 with respect to claim 1. Since dependent claim 14 incorporates all of the limitations of claim 1, claim 14 is likewise nonobvious over the cited combination of references at least for the reasons stated above.

8. **Rejection of Claim 15 under 35 U.S.C. § 103(a), as being unpatentable over U.S. Patent Publication No. US 2002/0006368 to Becker et al., hereafter "Becker", U.S. Patent No. 6,500,969 to Zhou, hereinafter "Zhou", U.S. Patent No. 6,782,892 to Li et al., hereafter "Li" and U.S. Patent Publication No. US 2002/0187082 to Wu, hereinafter "Wu" as**

**applied to claim 11, and further in view of U.S. Patent No. 6,653,356 to Sherman, hereinafter "Sherman".**

The forgoing remarks of Section 1 are incorporated herein by reference. Wu and Sherman fail to remedy the deficiencies in the combination of Becker, Zhou and Li as discussed in Section 1 with respect to claim 1. Since dependent claim 15 incorporates all of the limitations of claim 1, claim 15 is likewise nonobvious over the cited combination of references at least for the reasons stated above.

9. Rejection of Claims 16 and 17 under 35 U.S.C. § 103(a), as being unpatentable over U.S. Patent Publication No. US 2002/0006368 to Becker et al., hereafter "Becker", U.S. Patent No. 6,500,969 to Zhou, hereinafter "Zhou", U.S. Patent No. 6,782,892 to Li et al., hereafter "Li" and U.S. Patent Publication No. US 2002/0187082 to Wu, hereinafter "Wu" as applied to claim 11, and further in view of U.S. Patent Publication No. US 2005/0129591 to Wei et al., hereinafter "Wei".

The foregoing remarks of Section 1 are incorporated herein by reference.

Wu and Wei fail to remedy the deficiencies in the combination of Becker, Zhou and Li as discussed in Section 1 with respect to claim 1. Since dependent claims 16 and 17 necessarily incorporate all of the limitations of claim 1, are likewise nonobvious over the cited combination of references at least for the reasons stated above.

10. Rejection of Claims 18-20 under 35 U.S.C. § 103(a), as being unpatentable over U.S. Patent Publication No. US 2002/0006368 to Becker et al., hereafter "Becker", U.S. Patent No. 6,500,969 to Zhou, hereinafter "Zhou" and U.S. Patent No. 6,782,892 to Li et al., hereafter "Li" as applied to claim 1, and further in view of U.S. Patent No. 4,585,673 to Sigai, hereinafter "Sigai".

The foregoing remarks of Section 1 are incorporated herein by reference.

Sigai fails to remedy the deficiencies in the combination of Becker, Zhou and Li as discussed in Section 1 with respect to claim 1. Since dependent claims 18-20 necessarily incorporate all of the limitations of claim 1, they likewise are nonobvious over the cited combination of references at least for the reasons stated above.



11. Rejection of Claims 25, 27-30 and 32-34 under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent Publication No. US 2002/0006368 to Becker et al., hereafter "Becker", U.S. Patent No. 6,500,969 to Zhou, hereinafter "Zhou", U.S. Patent No. 6,782,892 to Li et al., hereafter "Li", U.S. Patent 6,887,291 to Alford, hereinafter "Alford" and U.S. Patent Publication No. US 2006/0078771 to Ballantine et al., hereinafter "Ballantine" and further evidenced by U.S. Patent No. 4,994,498 to Kinkade, hereinafter "Kinkade".

Claims 25, 27-30 and 32-34 stand rejected as obvious over Becker in view of Zhou, Li, Alford and Ballantine, and further evidences by Kinkade. The rejection in part, restates the grounds of rejection recited in Sections 1, 2 and 3 in rejecting claims 25, 27-30 and 33-34. In addition, the Examiner acknowledges that Becker does not disclose the fluidizing input at a 45 degree angle relative to the gas permeable layer. However, it the Examiner's position that such modification is a mere rearrangement of system parts that would not modify the operation of the system and would have been obvious. (Office Action of 12/20/07, page 21.)

Regarding claim 30, it is the position of the Examiner that 'modified Becker' further discloses product gas, exiting from the hollow interior region through the port, through the gas permeable separation device ( as modified by Alford), and recycled back to the fluidizing inlet. (Office Action of 12/20/07, page 21.)

Regarding claims 32 and 33, it is the position of the Examiner that 'modified Becker', as discussed in claim 30 teaches a filtration device (see Alford), and while 'modified Becker' does not disclose a second filtration device, duplication of parts has no patentable significance unless new and unexpected results are produced. (Office Action of 12/20/07, page 22.)

Applicants greatly appreciate the detailed basis of the rejection but must strongly disagree.

As amended, independent claim 25 recites the contaminated gas comprising at least one hydrocarbon contaminant. The forgoing remarks of

Sections 1, 2 and 3 are incorporated herein and read as being relative to independent claim 25 and dependent claims 27-30 and 32-34.

Applicants believe that the remarks and discussion therein with regard to Becker, Zhou, Li, Alford and Ballantine, and further evidenced by Kinkade, as directed to the rejection of claims 25,27-30 and 32-34 indicate that independent claim 25 is nonobvious, as are dependent claims 27-30 and 32-34 for at least the reasons stated above. Reconsideration and removal of the rejection is respectfully requested.

12. **Rejection of Claim 26 under 35 U.S.C. § 103(a), as being unpatentable over U.S. Patent Publication No. US 2002/0006368 to Becker et al., hereafter "Becker", U.S. Patent No. 6,500,969 to Zhou, hereinafter "Zhou", U.S. Patent No. 6,782,892 to Li et al., hereafter "Li", U.S. Patent 6,887,291 to Alford, hereinafter "Alford" and U.S. Patent Publication No. US 2006/0078771 to Ballantine et al., hereinafter "Ballantine" as applied to claim 25, and further evidenced by U.S. Patent No. 3,997,447 to Breton, et al., hereinafter "Breton".**

The outstanding Office Action acknowledges that 'modified Becker' fails to teach the at least one control device is configured to introduce the backpressure pulse of gaseous material through the gas permeable separation device for about 0.2 seconds and introduce at least one of the contaminated gas and fluidizing material into the hollow region for about 0.8 seconds. However, the position of the Examiner is that timing of the backpulse is a variable that can be modified, as taught by Breton. (Office Action of 12/20/07 page 23.)

Applicants appreciate the detailed basis of the rejection but must disagree.

The foregoing remarks of Sections 1, 2 and 3 are incorporated herein by reference. Breton does nothing to remedy the deficiencies in the references as stated herein. As such the combination of Becker, Zhou, Li, Alford and Ballantine, as further evidenced by Breton fails to teach or disclose all of the required limitations of dependent claim 26. Reconsideration and removal of the rejection is respectfully requested.

13. Rejection of Claim 31 under 35 U.S.C. § 103(a), as being unpatentable over U.S. Patent Publication No. US 2002/0006368 to Becker et al., hereafter "Becker", U.S. Patent No. 6,500,969 to Zhou, hereinafter "Zhou", U.S. Patent No. 6,782,892 to Li et al., hereafter "Li", U.S. Patent 6,887,291 to Alford, hereinafter "Alford" and U.S. Patent Publication No. US 2006/0078771 to Ballantine et al., hereinafter "Ballantine" as applied to claim 30, and further evidenced by U.S. Patent No. 5,936,135 to Choudhary, et al., hereinafter "Choudhary".

The forgoing remarks of Sections 1, 2 and 3 are incorporated herein by reference. Choudhary has merely been cited for disclosing a reactor for processing gas and a flame ionization detector at the outlet of the reactor. Moreover, Choudhary is directed to a method of converting lower alkane or a mixture of lower alkanes to aromatics or higher hydrocarbons. (Abstract) As such, one skilled in the art would not be motivated to use the method of Choudhary to combine Choudhary with known art of the time to degrade and decontaminate hydrocarbons as the present invention. As such, Choudhary may not be combined with the cited references, nor does anything in Choudhary, if erroneously combined, remedy the deficiencies in the combination of Becker, Zhou and Li as discussed in Sections 1, 2 and 3 with respect to claim 25, from which claim 31 depends. Since dependent claim 31 incorporate all of the limitations of claim 25, it is likewise nonobvious over the cited combination of references at least for the reasons stated above.

## CONCLUSION

Applicants respectfully submit that the Application and pending claims are patentable in view of the foregoing remarks. A Notice of Allowance is respectfully requested. As always, the Examiner is encouraged to contact the Undersigned by telephone if direct conversation would be helpful.

Respectfully Submitted,

/MaryEGolota/

Mary E. Golota  
Registration No. 36,814  
Cantor Colburn LLP  
(248) 524-2300

March 20, 2008

### CORRESPONDENCE ADDRESS ONLY

General Motors Corporation  
Mail Code 482-C23-B21  
P.O. Box 300  
Detroit, MI 48265-3000  
Customer No.

MEG/CR